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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/450,351 11/29/99 YAMAMOTO

T SHM-00901

026339 MMC2/0405
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101 FEDERAL STREET
BOSTON MA 02110

EXAMINER

TSAIL.H

ART UNIT

PAPER NUMBER

2812

DATE MAILED:

04/05/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/450,351

Applicant(s)
Yamamoto

Examiner
H, Jey Tsai

Group Art Unit
2812



☒ Responsive to communication(s) filed on 1/24/01

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1-29 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-29 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____.

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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Claim Rejections - 35 U.S.C. § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-29 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Nishikawa 6,087,261 in view of Tamaru et al. 6,103,566 and Lee et al. 6,010,940, all are previously applied.

The reference(s) teach the features :

Nishikawa substantially discloses a method of forming a capacitor on the semiconductor device, which includes :

forming a tantalum oxide dielectric layer 5, fig. 4B,

treating substrate in the chamber with at least one of a gas containing non-reactive NH_3 and helium gases flow, col. 9, lines 1+,

heating the substrate in the NH_3 ambient at about 0.15 torr, fig. 6, col. 9, lines 30+,

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introducing the source gas containing a high melting point metal TiCl_4 to form TiN layer 6.

The difference between the reference(s) and the claims are as follows:

Nishikawa et al. teaches using helium as inert gas. However, Tamaru et al. teaches using nitrogen gas during the heat treatment process, before introducing NH_3 , then forming metal nitride with high melting metal containing gas in col. 18, lines 27+ and col. 16, lines 20. And, Lee teaches annealing the substrate with NH_3 after forming TiN .

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified Nishikawa et al.'s process with nitrogen gas to stabilize the tantalum oxide with heat treating step as suggested by Tamaru et al. because nitrogen does not reoxidize the tantalum oxide.

Applicant's arguments filed Jan. 24, 2001 have been fully considered but they are not persuasive.

Applicant contends that Nishikawa teaches using an oxidizing ambient and not an inert ambient. This is not found to be persuasive because there is not seen an inert ambient in the

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claimed invention, e.g. in claim 1, it reads "with at least one of a gas non-reactive with respect to said metal oxide...".

Nishikawa teaches one of gases is helium gas which is an inert gas, hence is non-reactive with respect to the tantalum oxide layer 5, therefore, it meets the claimed invention. see col. 9, lines 13+,

Applicant contends that Nishikawa teaches introducing He and oxygen prior to the deposition of metal oxide during the a chamber purging step. This is not found to be persuasive because Nishikawa teaches reduction or reoxidation of Ta_5O_5 by introducing oxygen and helium is prevented in col. 9, lines 12+. And, oxygen only react with the carbon or hydrogen in the Ta_5O_5 layer not Ta_5O_5 layer itself. Tamaru et al. also teaches one of inert gases is He, Ar or N_2 with respect to the tantalum oxide and a NH_3 gas and metal source gas $TiCl_4$ in col. 16, line 15+ and fig. 35.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is

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not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry of a general nature or clerical matters or relating to the status of this application or proceeding should be directed to the Group customer service whose telephone number is (703) 306-3329 and Fax number (703) 306-5515. Group receptionist telephone number 703-308-0956.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to H. Jey Tsai whose telephone number is (703) 308-1374. The examiner can normally be reached on from 7:00 Am to 4:00 Pm., Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on (703) 308-3325. The fax phone number for this Group is (703) 305-3431.

hjt
02/16/1



H. Jey Tsai
Primary Examiner
Patent Examining Group 2800